

## CLAIMS

1. Method for controlling a direct-injection gasoline engine during regeneration of a lean NO<sub>x</sub> trap disposed in an exhaust path of the engine, the regeneration characterized by a transition from stratified lean engine operation to homogeneous rich engine operation, comprising:
  - 5 determining a base desired torque;
  - estimating a decrease in engine torque that would result from transitioning from stratified lean engine operation to homogeneous rich engine operation during a lean NO<sub>x</sub> trap regeneration; and
  - applying a compensating control torque to the engine in an amount sufficient to compensate for the estimated decrease in engine torque thereby maintaining the base desired torque level during the lean NO<sub>x</sub> trap regeneration.
2. The method of claim 1, wherein estimating a decrease in engine torque comprises:
  - determining a desired mass of air charge and exhaust gas recirculation for a lean NO<sub>x</sub> trap regeneration;
  - 5 determining a reference value for manifold absolute pressure for the lean NO<sub>x</sub> trap regeneration; and
  - determining a compensating torque feed-forward value sufficient to maintain the base desired torque level during lean NO<sub>x</sub> trap regeneration from the determined desired mass of air charge and exhaust gas recirculation
  - 10 and the determined reference value for manifold absolute pressure.
3. The method of claim 1, wherein applying a compensating control torque to the engine comprises:
  - increasing fueling to the engine in an amount sufficient to effect said compensating control torque.

4. The method of claim 1, wherein determining a base desired torque is accomplished in accordance with one or more of a throttle pedal position, a cruise control setting and an idle speed control.

5. The method of claim 1, further comprising:  
determining the end of the lean NOx trap regeneration event; and  
ending the step of applying a compensating control torque at the end of the lean NOx trap regeneration.

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6. System for controlling a direct-injection gasoline engine during regeneration of a lean NOx trap disposed in an exhaust path of the engine, the regeneration characterized by a transition from stratified lean engine operation to homogeneous rich engine operation, comprising:

5 means for determining a base desired torque;  
means for estimating a decrease in engine torque that would result from transitioning from stratified lean engine operation to homogeneous rich engine operation during a lean NOx trap regeneration; and  
means for applying a compensating control torque to the engine  
10 in an amount sufficient to compensate for the estimated decrease in engine torque thereby maintaining the base desired torque level during the lean NOx trap regeneration.

7. The method of claim 6, wherein estimating a decrease in engine torque comprises:

5 means for determining a desired mass of air charge and exhaust gas recirculation for a lean NOx trap regeneration;  
means for determining a reference value for manifold absolute pressure for the lean NOx trap regeneration; and

means for determining a compensating torque feed-forward value sufficient to maintain the base desired torque level during lean NOx trap regeneration from the determined desired mass of air charge, and exhaust gas recirculation and the determined reference value for manifold absolute pressure.

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8. The method of claim 6, wherein applying a compensating control torque to the engine comprises:

means for increasing fueling to the engine in an amount sufficient to effect said compensating control torque.

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9. The method of claim 1, further comprising:

means for determining the end of the lean NOx trap regeneration event; and

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means forending the step of applying a compensating control torque at the end of the lean NOx trap regeneration.

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10. Article of manufacture comprising a storage medium having a computer program encoded therein for effecting coordinated control of engine operation and regeneration of a lean NOx trap disposed in an exhaust path of a direct-injection gasoline engine, the regeneration characterized by a transition from stratified lean engine operation to homogeneous rich engine operation, the program comprising:

code for determining a base desired torque;

code for estimating a decrease in engine torque that would result from transitioning from stratified lean engine operation to homogeneous rich engine operation during a lean NOx trap regeneration; and

code for applying a compensating control torque to the engine in an amount sufficient to compensate for the estimated decrease in engine torque

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thereby maintaining the base desired torque level during the lean NOx trap regeneration..

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11. The article of claim 10, wherein said code for estimating a decrease in engine torque comprises:

code for determining a desired mass of air charge and exhaust gas recirculation for a lean NOx trap regeneration;

5 code for determining a reference value for manifold absolute pressure; and

code for determining a compensating torque feed-forward value sufficient to maintain the base desired torque level during lean NOx trap regeneration from the determined desired mass of air charge and exhaust gas 10 recirculation and the determined reference value for manifold absolute pressure.

12. The article of claim 10, wherein said code for applying a compensating control torque to an engine comprises:

code for increasing fueling to the engine in an amount sufficient to effect said compensating control torque.

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13. The article of claim 10 further comprising:

code for determining the end of lean NOx trap regeneration; and  
code for ending the application of the compensating control

torque at the end of the lean NOx trap regeneration.

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